National Institute of Environmental Health Sciences

Heat waves observed in 2007 in Athens, Greece: Synoptic conditions, bioclimatological assessment, air quality levels and health effects

Author(s): Theoharatos G, Pantavou K, Mavrakis A, Spanou A, Katavoutas G, Efstathiou P, Mpekas P, Asimakopoulos D

Year: 2010

Journal: Environmental Research. 110 (2): 152-161

Abstract:

Heat waves are considered to be increasing in frequency and intensity whereas they comprise a significant weather-related cause of deaths in several countries. Two heat waves occurred in Greece in summer 2007. These severe heat waves are assessed by analyzing the prevailing synoptic conditions, evaluating human thermal discomfort, through the Heat Load Index (HL), as well as investigating its interrelation of air pollutant concentrations, and the daily air quality stress index (AQSI), in the greater region of Athens (Attica), Greece. Furthermore, the relation of HL values and the number of heatstroke and heat exhaustion events recorded in public hospitals operating within the Greek National Health System is examined. Data included radiosonde measurements from the Athens airport station (LGAT), NCEP/NCAR reanalysis data in order to obtain the position of the Subtropical Jet Stream (STJ), GDAS meteorological data for back-trajectory calculation, 10-min meteorological data from 10 Hydro-Meteorological stations and mean hourly values of nitric dioxide (NO(2)), sulphur dioxide (SO(2)) and ozone (O(3)) concentrations, measured at 7 different sites, for the last 10-day period of June and July 2007. Spearman's rank correlation test was used to observe any possible correlation between HL values and air pollutant concentrations, and AQSI values. The results demonstrated different synoptic characteristics for the heat waves of June and July. In the heat wave of June, higher ambient temperatures were recorded and greater HL values were calculated. Extreme discomfort conditions were identified in both heat waves during both day-time and night-time hours. The air pollution analysis showed poor air quality conditions for the heat wave of July, while a significant correlation was found between HL values and average hourly concentrations of O(3), NO(2) and SO(2). The number of heat-affected patients reported during the June heat wave was larger.

Source: http://dx.doi.org/10.1016/j.envres.2009.12.002

Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Air Pollution, Meteorological Factors, Meteorological Factors, Solar Radiation, Temperature, Other Exposure

Air Pollution: Interaction with Temperature, Ozone, Other Air Pollution

Air Pollution (other): NO2;SO2

Temperature: Extreme Heat

Other Exposure: Heat Load Index

Geographic Feature: ☑

resource focuses on specific type of geography

Urban

Geographic Location: ☑

resource focuses on specific location

Non-United States

Non-United States: Europe

European Region/Country: European Country

Other European Country : Greece

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Injury, Other Health Impact

Other Health Impact: heat related morbidity and mortality

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified